

REMARKS

Claims 1-6 stand rejected under 35 U.S.C. 103(a) being unpatentable over Komuro et al. (U.S. Patent No. 6,587,318), in view of Kawato et al. (U.S. Patent No. 6,327,123). Applicant respectfully traverses the rejection because there is no motivation to combine a tunnel magnetoresistive (TMR) sensor of a current perpendicular to the plane (CPP) type structure as taught by Komuro with an MR sensor of a CPI type (spin-valve sensor of an in-plane structure) as taught by Kawato.

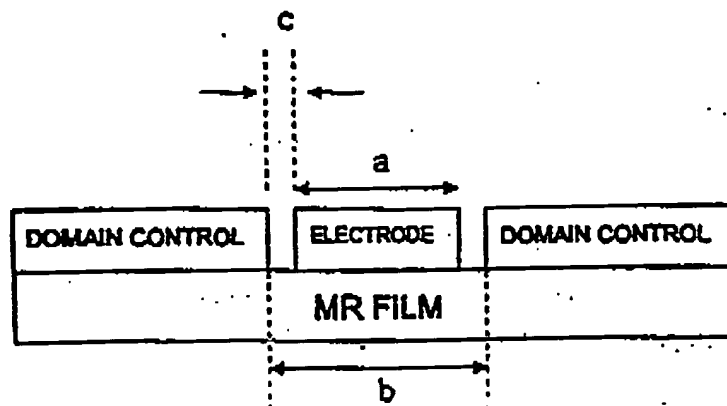
Komuro teaches a TMR sensor of a CPP type, which results in the sense current flowing perpendicular to the MR film (See the Abstract). With respect to claims 1 and 5, the Examiner correctly notes that Komuro does not clearly disclose that the magnetic domain control films are formed on the free layer. Furthermore, with respect to claims 4 and 6, the Examiner correctly identifies that Komuro does not disclose that: 1) both of the electrodes are provided on the magnetic domain control regions; 2) that each electrode has a tip end part extending over a magnetoresistive film toward the other electrode; and 3) that each tip end part extends beyond the domain control region on which the electrode having the tip end part is provided, with a protruding distance of 0.25 μ m or less. The Examiner cites Kawato as teaching these features.

Kawato, however, teaches an MR sensor of a CPI structure in which the sense current flows parallel to the MR layer, unlike the present invention which provides an MR head of a CPP type. Accordingly, there is no motivation to combine the Kawato and Komuro references since they teach different MR head structures.

It is an object of the present invention to provide an MR head of the CPP type in which a sense current is caused to flow perpendicular to the MR film, and wherein the effective core

width is minimized while maintaining a high S/N ratio by injecting the sense current selectively into the core region to avoid injection of the sense current into the domain control regions.

The following is the schematic illustration of the CPP type MR head according to the present invention.



Thus, the CPP type MR head of the present invention achieves the following effects:

1) minimizing the distance "c" between the magnetic domain control region and the electrode; and 2) eliminating shunt i.e., "a" should be not larger than "b". In the present invention, the effect of eliminating shunt is a requirement imposed on the MR head of the CPP structure.

In contrast, in the MR sensor of the CPI type as taught by Kawato, there is no requirement about the effect 2) as discussed above. In addition, Komuro merely addresses the requirement for the effect 2) discussed above. Accordingly, since Kawato does not require such an effect 2), and because Kawato and Komuro are directed to different MR head structures, there is no motivation for one skilled in the art to combine the teaching of Kawato and Komuro. For this reason, withdrawal of the § 103 rejection of claims 1-6 is respectfully requested.

For all of the foregoing reasons, Applicant submits that this Application is in condition for allowance, which is respectfully requested. The Examiner is invited to contact the undersigned attorney if an interview would expedite prosecution.

Respectfully submitted,

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